DOCUMENT RESUME

ED 253 575 TM 850 120

AUTHOR Wright, Delivee L.; Bond, Steven C.
TITLE The Relationship of Individual Differences and Student Attitudes to Achievement: An Interactive View.
PUB DATE 1 Apr 85
NOTE 21p.; Paper presented at the Annual Meeting of the American Educational Research Association (69th, Chicago, IL, March 31-April 4, 1985). Study was made possible by a grant from the University Foundation, Lincoln, Nebraska.
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; *Aptitude Treatment Interaction; Correlation; Higher Education; *Individual Differences; Multiple Regression Analysis; Multivariate Analysis; *Predictor Variables; Student Attitudes; *Student Characteristics

ABSTRACT

The relationships between a diverse set of individual difference, demographic, and aptitude variables; and a set of student attitudes and behaviors pertinent to experiences in large lecture classes were examined. The sample was 4300 students enrolled in 33 lecture classes at a large university. The relationship between the set of individual difference and background variables and the set of classroom attitudes and behaviors were examined by canonical analysis resulting in six significant canonical relations: (1) student ability to course grade received; (2) student ability, population of students' home communities, and high school class size to student effort; (3) students' family income and educational aspirations to their perceptions of background similarity of other students, instructor contact, and student attendance and motivation; (4) students' predictions of their college grades and educational aspirations to their perceptions of adequacy of classroom facilities, course reputation, and friendliness of other students; (5) students' family income to their perceptions of the adequacy of classroom facilities and course reputation; and (6) population of students' home communities, high school grades, and educational aspirations to their perceptions of the friendliness of other students, their opinions when registering, and contact with the instructor. Implications for traditional approaches to the study of achievement are discussed. (Author/BW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED253575

The Relationship of Individual Differences and Student Attitudes to Achievement: An Interactive View

Delivee L. Wright, Director
Teaching and Learning Center
University of Nebraska-Lincoln

Steven C. Bond, Graduate Research Assistant
Teaching and Learning Center
University of Nebraska-Lincoln

A paper presented at the 1985 Annual Meeting of the American Educational Research Association, Division C, Chicago, Illinois, April 1, 1985

*This study was made possible by a Kelly II grant from the University Foundation, Lincoln, Nebraska.

TM 850 120

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

D. L. Wright

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

THE RELATIONSHIP OF INDIVIDUAL DIFFERENCES AND STUDENT ATTITUDES TO ACHIEVEMENT: AN INTERACTIVE VIEW

ABSTRACT

The relationships between (1) a diverse set of individual difference, demographic, and aptitude variables; and a (2) set of student attitudes and behaviors pertinent to experiences in large lecture classes were examined. The sample was 4300 students enrolled in 33 lecture classes at a large university. The relationship of these individual difference and attitude variables to achievement was examined by regression analysis. The relationship between the set of individual difference and background variables and the set of classroom attitudes and behaviors were examined by canonical analysis resulting in six significant canonical relations. Implications for traditional approaches to the study of achievement are discussed.

The Relationship of Individual Differences and Student Attitudes to Achievement: An Interactive View

Student diversity in ability, motivation, attitudes, personality, learning styles, sex, ethnicity and socioeconomic status is a fact. The study of individual differences from both a practical and a theoretical perspective has been the focus of sustained interest in recent years. Many topics representing diverse characteristics of students have been investigated including intelligence, special abilities, creativity, cognitive styles, personal constructs, values, attitudes and interests (Tyler, 1974, 1978 and Messick, 1976). Numerous theoretical definitions and categories of individual differences have been proposed (Messick, 1976; and Mischel, 1981). In addition, many educators have agreed that decisions regarding the practice of teaching should be based on consideration of the individual differences of both teachers and students.

Both practically and theoretically the role of individual differences is complicated by an interest in multiple educational outcomes. For example, Pascarella (1980) has identified six dimensions of college outcomes: academic performance, intellectual development, personal development, educational/career aspirations, college satisfaction and institutional integration. Of these six outcomes, the relationship of academic performance to individual differences has probably been the focus of the greatest number of studies.

The relationships of many individual difference variables to academic performance (achievement) have been investigated in recent years. Three general approaches are discernable. First, are studies that focus on intelligence and social background variables such as socioeconomic status. (Johnson and Butts, 1983; Fleming and Malone, 1983; Ma Li-chen, 1983) Second, are studies that focus on student psychological characteristics such as locus of control, cognitive style, field dependence/independence and level of operational thought (Tusk, 1983; and Roberge and Flexar, 1984). Also included in this category are those approaches that assess student perceptions, attitudes, and attributions (Owens and Barnes, 1982; Schunk, 1984; Wilson and Palmer, 1983; Steinkamp and Maehr, 1983). The third category consists of those studies that address the issue of individual differences and achievement from a psycho-social or process perspective (Fraser and Fisher, 1982 and Rouse, 1983). For a review of research on student variables, see Weinstein (1983).

Understanding student achievement has been enhanced by these endeavors; however, much existing research is characterized by a narrow approach. They often are correlational studies of single variables as investigators search for some effect on student attitude, behavior or achievement (Berliner, 1984). Cross (1971, 1976) has repeatedly warned both practitioners and scholars of an "investigative lens too narrowly focused." The tendency of past research to examine single variables is noted by Good (1983). He recognized the need for a focus, but also pointed out the need for research to become more comprehensive.

Research can become more comprehensive in at least two ways. The first is to consider teacher and organization-environment level variables in addition to student variables. Numerous studies consider teacher or organization/environment level variables in isolation; for example, teacher locus of control (Sadowski and Woodward, 1984), teacher anxiety (Galbo, 1984), teacher enthusiasm (McKinney, et. al., 1984), type of institution (Chickering, 1974) and university characteristics (Ayres and Bennett, 1983). Although several recent reviews presented models incorporating teacher and institution variables (Centra and Potter, 1980; Haertel, Walberg and Weinstein, 1983; and Sherman, 1985), no comprehensive empirical investigations were identified. A second method for developing more comprehensive research is to consider a larger set of student individual differences to ascertain their relationships to achievement relative to one another; thus, improving upon the limited perspective of studies utilizing only single variables. The latter of these two approaches was used in the present study.

This study paralleled that of earlier research in that it attempted to contribute to a greater understanding of the relationship between individual differences and achievement. It differed from much of the extant research because of an explicit attempt to use a broader approach, recognizing the complexity of the relationships. The purposes of this study were two-fold; first, to investigate the relationships between a diverse set of individual difference (demographic and background) and aptitude variables, and a set of student attitudes and behaviors pertinent to achievement in large college lecture classes; and second, to examine the relationship of

these variables, individually, to achievement in large college lecture courses.

Method

Subjects. Subjects were 4300 undergraduate students enrolled in 33 large lecture classes (100+ students) at a large land-grant university. The 33 courses were selected using a stratified sampling procedure that resulted in a final sample that had at least two courses in each of the eight subject-matter categories proposed by Biglan (1973). Forty-three hundred students had complete data available and were included in the sample.

Instruments and Procedures. Data were obtained from three sources. First, a diverse set of individual difference variables was obtained from university records. A portion of this information was obtained from students at the time they registered for a standardized achievement test before entering the university. The remainder was obtained from students at times of university registration and enrollment. This set of variables included such information as birth year, sex, numerous aptitude and achievement scores, demographic information, socioeconomic status, race and educational aspirations.

Second, a 50-item questionnaire was administered in the 33 classes at the end of the semester. The instrument was designed to measure numerous attitudes and behaviors relevant to achievement in an academic course. A factor analysis of the data suggested that the responses be interpreted as twelve factors including: evaluation of instructor, evaluation of the course, student effort, evaluation of classroom facilities, previous advice received about the reputation of

the course, student attendance and motivation, student contact with instructor outside of class, student preference for the course format, student friendliness and classroom atmosphere, use of visual instructional aids, student opinion when registering, similarity of other students' backgrounds. The twelve factors accounted for 57 percent of the total variance of the original fifty items.

Third, course grade served as the dependent variables. Eight values were possible ranging from A to F including the values of 'B+', 'C+', and 'D+'.

Results

Regression Analysis. The set of individual difference, demographic, aptitude, classroom attitude and behavior variables were regressed on the achievement variable using a stepwise analysis. The values of the twelve factor scores were used in the analysis rather than the responses to the fifty items on the questionnaire. A regression method was used to calculate the factor scores. (SPSSX User's Guide, 1983) A set of six variables emerged as the best predictors of achievement. Listed in descending order, the six variables were: attitude prior to enrolling in the course and reliance on opinions from others (reputation of course); aptitude, as reflected by performance on a standardized college entrance exam; student assessment of the amount of effort exerted in the course; student assessment of the course content and quality (course characteristics); high school grade point average; and year of graduation from high school. Respectively, the six variables accounted for 26, 16, 7, 3, 3, and 2 percent of the variance of the

dependent variable. An additional twelve variables were statistically significant; however, their total contribution was considered too insignificant from a practical perspective since they each accounted for less than one percent of variance of the dependent variable (course grade).

Insert Table 1 Here

Canonical Analysis. A canonical analysis was performed using (1) the diverse set of individual differences, demographic, and aptitude variables as independent variables; and using (2) the classroom attitudes and behaviors measured by the questionnaire and course grade as the dependent variables. Again, the values of the twelve factor scores were used in the analysis rather than the responses to the fifty items on the questionnaire. Six significant canonical correlations emerged, accounting for 57% of the variance of the independent variable (individual differences, demographic, and aptitude variables) and 41% of the variance of the set of dependent variables (classroom attitudes and behaviors). The six canonical correlations accounted for 69, 9, 6, 4, 3, and 3 percent of the variance of the dependent variables.

Insert Table 2 Here

An examination of the canonical coefficients and correlations between variables and the canonical functions suggested that the six

significant canonical relationships be interpreted as follows. The first canonical correlation was characterized by the relationship of student ability, measured by a standardized college entrance exam and high school grade point average to the course grade received.

The second canonical correlation was characterized by the relationship of the same ability measures contained in the first function (standardized collenge entrance exam and high school G.P.A.) in combination with the two indicators of population of students' home communities and high school class size. This set of four independent variables was related to the level of student effort in the course. Less effort was reported from students with higher exam scores, from larger communities, or larger high school classes. There was a positive relationship between amount of effort and high school GPA.

The third canonical correlation consisted of the relationship of students' family income and educational aspirations to the students' perception of similarity of background of other students, amount of instructor contact, and student attendance and motivation. Students from families with higher incomes, or pursuing vocational or bachelors degrees rather than advanced degrees reported greater similarity with other students, greater contact with instructors, and higher attendance.

The fourth canonical correlation was characterized by the relationship of students' predictions of their college grade point averages and education aspirations to their perceptions of the adequacy of classroom facilities, reputation of the course, and friendliness of other students. Students with higher expectations for their college GPA's and educational aspirations reported that

classroom facilities were better, other students were more friendly and were more apt to rely on other students advice (reputation) when registering for class.

The fifth canonical correlation was characterized by the relationship of students' family incomes to their perception of the adequacy of classroom facilities and reputation of the course. Students from families with higher incomes were less likely to consider the advice of other students about courses and more likely to rate the classroom facilities as adequate.

The sixth canonical correlation consisted of the relationship of the population of students' home communities, high school grade point averages and educational aspirations to students' assessments of the friendliness of other students, the students' opinions when registering for the courses, and amounts of contact with the instructor. Students from smaller communities, with lower high school GPA's or higher educational aspirations rated students as more friendly, had less positive opinions about the course when registering and had less contact with the instructor.

Insert Table 3 Here

Discussion

The study of academic performance is of interest to theorists and practitioners alike. An understanding of student achievement, whether from a theoretical or practical perspective, has often been illusive because it is so inextricably related to the multitude of student

individual differences, and to the issues of teacher effectiveness, instructional processes and school-institutional characteristics. The literature reflects an increasing call for research efforts capable of addressing this complexity in a more comprehensive manner.

The analyses reported here were more comprehensive than traditional single variable designs in that diverse sets of individual differences and attitudes and behaviors were examined. A canonical analysis confirmed several traditional perceptions relative to academic performance (e.g., canonical variables 1 and 2, importance of ability); but also suggested the relevance student individual differences to classroom attitudes and behaviors (e.g., canonical variables 3, 4, 5, and 6).

Conclusions

It seems clear that student attitudes, perceptions (Marx, 1983) and motivations (Brophy, 1983) are relevant to academic performance and other educational outcomes. It is equally clear that the incorporation of such variables into comprehensive research studies is a difficult and complicated task. It is thus not surprising that a great deal of research addresses only single variables, forsaking a comprehensive perspective in favor of the apparent clarity of less comprehensive research designs.

This is not to suggest that such efforts have not contributed to our understanding of academic performance and the teaching process. Indeed, they have. Rather, we suggest that to gain further insight into the complexities of a process subject to the influence of numerous factors, research efforts must incorporate strategies and

techniques capable of addressing the great complexities of instructional relationships.

REFERENCES

Ayres, Q. Whitfield and Bennett, Ronald W. (1983). University Characteristics and Student Achievement. Journal of Higher Education, 54, 5. Ohio State University Press.

Berliner, David C. (1984). The Half-Full Glass: A Review of Research on Teaching. Using What We Know About Teaching. Philip L. Hosford, Editor, Alexandria, Virginia: Association for Supervision and Curriculum Development.

Biglan, Anthony. (1973). Relationships Between Subject Matter Characteristics and the Structure and Output of University Departments. Journal of Applied Psychology, 53, 204-213.

Brophy, Jere. (1983). Conceptualizing Student Motivation. Educational Psychologist, 18, 3, 200-215.

Centra, John A. and Potter, David A. (1980). School and Teacher Effects: An Interrelational Model. Review of Educational Research, 50, 2, 273-291.

Chickering, A. (1974). Commuting Versus Resident Students. San Francisco: Jossey-Bass Publishers.

Cross, K. P. (1971). Beyond the Open Door. San Francisco: Jossey-Bass Publishers.

Cross, K. P. (1976). Accent on Learning: Improving Instruction and Reshaping the Curriculum. San Francisco: Jossey-Bass Publishers.

Fleming, M. Lynette and Malone, Mark R. (1983). The Relationship of Student Characteristics and Student Performance in Science as Viewed by Meta-analysis Research. Journal of Research in Science Teaching, 20, 5, 481-495.

Fraser, Barry J. and Fisher, Darrell L. (1982). Predicting Students' Outcomes from Their Perceptions of Classroom Psychosocial Environment. American Educational Research Journal, 19, 4, 498-518.

Galbo, Joseph J. (1984). Teacher Anxiety and Student Achievement. Educational Research Quarterly, 7, 4, 44-49.

Good, Thomas L. (1983). Classroom Research: A Decade of Progress. Educational Psychologist, 18, 3, 127-144.

Haertel, Geneva D.; Walberg, Herbert J.; and Weinstein, Thomas. (1983). Psychological Model of Educational Performance: A Theoretical Synthesis of Constructs. Review of Educational Research, 53, 1, 75-91.

Johnson, T. Franklin and Butts, David P. (1983). The Relationship Among College Science Student Achievement Characteristics. Journal of Research in Science Teaching, 20, 4, 357-366.

Ma, Li-chen. (1983). Family Ties as Related to Academic Performance of College Students. College Student Journal, 17 3, 308-316.

Marx, Ronald W. (1983). Student Perception in Classrooms. Educational Psychologist, 18, 3, 145-164.

McKinney, C. Warren, et. al. (1984). Some Effects of Teacher Enthusiasm on Student Achievement in Fourth Grade Social Studies. Journal of Educational Research, 76, 4, 249-253.

Messick, Samuel, Editor. (1976). Individuality in Learning. San Francisco: Jossey-Bass Publishers.

Mischel, W. (1968). Personality and Assessment. New York: Wiley & Sons.

Owens, Lee and Barnes, Jennifer. (1982). The Relationships Between Cooperative, Competitive, and Individualized Learning Preferences and Students' Perceptions of Classroom Learning Atmosphere. American Educational Research Journal, 19, 2, 182-200.

Pascarella, Ernest T. (1980). Student-Faculty Informal Contact and College Outcomes. Review of Educational Research, 50, 4, 545-595.

Roberge, James L. and Flexar, Barbara K. (1984). AERJ, 21, 1, 227-232.

Rouse, Linda P. (1983). Social Power in the College Classroom: The Impact of Instructor Resource Manipulation and Student Dependence on Graduate Students' Mood and Morale. American Educational Research Journal, 20, 3, 375-383.

Sadowski, Cyril J. and Woodward, Helen R. (1984). Teacher Locus of Control and Classroom Climate: A Cross-lagged Correlational Study. Psychology in the Schools, 20, 4, 506-509.

Sherman, Thomas M. (1985). Learning Improvement Programs: A Review of Controllable Influences. Journal of Higher Education, 56, 1.

Schunk, Dale H. (1984). Self-Efficacy Perspective On Achievement Behavior. Educational Psychologist, 19, 1, 48-58.

SPSSX User's Guide. (1983). McGraw-Hill Book Company, New York.

Steinkamp, Marjorie W. and Maehr, Martin L. (1983). Affect, Ability, and Science Achievement: A Quantitative Synthesis of Correlational Research. Review of Educational Research, 53, 3, 369-396.

Thompson, Bruce. (1984). Canonical Correlations Analysis: Uses and Interpretations. Sage University Papers, Beverly Hill: Sage Publication.

Tusk, Sally. (1983). Interaction of Test Anxiety and Locus of Control on Academic Performance. Psychological Reports, 53, 2, 639-694.

Tyler, L. E. (1984). Individual Differences: Abilities and Motivational Directions, Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

Tyler, L. E. (1978). Individuality: Human Possibilities and Personal Choice in the Psychological Development of Men and Women. San Francisco: Jossey-Bass Publishers.

Weinstein, R. (1983). Student Perceptions of Schooling. Elementary School Journal, 83, 287-312.

Willson, Victor L. and Palmer, Douglas J. (1983). Latent Partition Analysis of Attributions for Actual Achievement. American Educational Research Journal, 20, 4, 581-589.

Table 1

Descriptive Statistics for Six Significant Predictor Variables and Course Grade

Variable	Mean	Standard Deviation	Correlation Matrix 1	2	3	4	5	6
1. Reputation of Course[a]	-.025	.768	X					
2. Composite score Standardized Achievement test[b]	22.600	4.740	-.174	X				
3. Student Effort[a]	-.030	.863	.035	.254	X			
4. Assessment of Course Characteristics[a]	-.006	.846	.163	-.039	-.025	X		
5. High School G.P.A.[b]	3.320	.596	-.245	.550	.125	-.001	X	
6. Year of High School Graduation[b]	81.990	1.290	-.044	.012	-.155	.026	.072	X
7. Grade in Course	2.750	1.050	-.507	.489	.342	-.265	.474	-.157

[a]Attitude or behavior factor score from questionnaire.

[b]Background variable obtained from university records.

Table 2

Stepwise Multiple Regression, Multiple Correlation and Parsimonious Model Regression Weights

Step #	Variable	Multa R	B	SE B	Df	F	R^2	R^2 increase
1	Reputation of course	.507	-.697	.028	1/1772	612.84	.257	.257
2	Composite Standardized Achievement Test	.650	.092	.004	2/1771	647.67	.422	.165
3	Student Effort	.701	.333	.022	3/1770	569.04	.491	.069
4	Assessment of Course Characteristics	.722	-.218	.021	4/1769	480.40	.521	.030
5	High School GPA	.741	.363	.035	5/1768	429.40	.548	.027
6	Year of High School Graduation	.755	-.122	.013	6/1767	390.67	.570	.022

NOTE: An additional twelve variables were entered into the regression equation on subsequent steps. Together they accounted for only 3% of the variance of the dependent variable (course grade); and were therefore not reported. At step 6 the regression equation is as follows:

$$\text{Predicted Course Grade} = -.539\,(\text{Reputation of Course}) + .052\,(\text{Composite Standardized Achievement Test}) + .297\,(\text{Student Effort}) - .225\,(\text{Course Characteristics}) + .385\,(\text{High School GPA}) - .122\,(\text{Year of Graduation}) + 10.316$$

Table 3

Summary of Canonical Relationships

	DEPENDENT VARIABLES				INDEPENDENT VARIABLES			
Canonical Variable	Standardized Canonical Coefficients*		Correlation to Canonical Variable		Standardized Canonical Coefficients		Correlation to Canonical Variable	
1	GRADE	(-.96)	GRADE	(-.92)	ACHCOMP	(-.64)	ACHCOMP	(-.90)
					HSAVE	(-.28)**	HSAVE	(-.77)
2	EFFORT	(.65)	EFFORT	(.56)	ACHCOMP	(.75)	POPUL	(.60)
					HSAVE	(-.31)**	CLASS SZ	(.58)
					POPUL	(.32)**	HSAVE	(-.35)
					CLASS SZ	(.30)**	ACHCOMP	(.28)
3	SIMIL	(.57)	SIMIL	(.57)	FAM INCM	(.49)	FAM INCM	(.50)
	INSTR	(-.48)	INSTR	(-.52)	EDASPIRE	(-.46)	EDASPIRE	(-.42)
	ATTEND	(-.42)	ATTEND	(-.43)				
4	CLASS	(.60)	CLASS	(.58)	ESTGPA	(-.70)	ESASPIRE	(-.48)
	REPUTE	(.51)	FRIEND	(.45)	EDASPIRE	(-.38)**	ESTGPA	(-.49)
	FRIEND	(.48)	REPUTE	(.36)				
5	REPUTE	(.65)	CLASS	(-.52)	FAM INCM	(.54)	FAM INCM	(.51)
	CLASS	(-.51)	REPUTE	(.48)				
6	FRIEND	(-.51)	FRIEND	(-.46)	POPUL	(-.76)	POPUL	(-.62)
	COURSE	(.46)	INSTR	(.40)	HSAVE	(-.71)	EDASPIKE	(.30)
	INSTR	(.41)	COURSE	(.33)	EDASPIRE	(.44)	HSAVE	(-.20)

KEY:
EFFORT - Student Effort
CLASS - Adequacy of Classroom Facilities
REPUTE - Reputation of Course
ATTEND - Attendance and Motivation
INSTR - Instructor Contact
FRIEND - Friendliness of Other Students
COURSE - Opinion About Course When Registering
SIMIL - Similarity of Background of Other Students
ACHCOMP - Composite - Standardized Achievement Test
HSAVE - High School Grade Point Average (G.P.A.)
POPUL - Population of Home Community
CLASS SZ - Size of High School Class
FAM INCM - Family Income
EDASPIRE - Educational Aspirations
ESTGPA - Self-Prediction of College G.P.A.

NOTE: Dependent variables represent factor scores from questionnaire. Independent variables were obtained from University records. Listwise deletion of data resulted in a sample of 1805 for this analysis.

* A cutoff criteria of .40 on the standardized canonical coefficients was used to assign variables to the canonical variables.

** Indicates those variables with standardized canonical coefficients less than .40 that were retained because of nigh correlation to canonical variable.